

# Disparity Map Estimation Using SAD and SSD

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Implementation is available in the following GITHUB repo: [link](#)

## 1. Results

Input Image:



Left Image



Right Image



Disparity Map SAD Output GPU



Disparity Map SSD Output GPU



## Disparity Map SAD Output CPU

## Disparity Map SSD Output CPU

### Performance results on NVIDIA and AMD

```

Using platform 'NVIDIA CUDA' from 'NVIDIA Corporation'
Using device 1 / 1
Running on NVIDIA GeForce MX450 (7.5)

----- CPU Execution Started -> SAD -----
CPU Execution Time : -> SAD 42.140817s
----- CPU Execution End -> SAD -----
----- GPU Execution Start -> SAD -----
GPU Read/Write Time : 0.001165s
GPU Execution Time : 0.272270s
----- GPU Execution End -> SAD -----

*****
GPU Speedup over CPU with method -> SAD 154.776
*****

----- CPU Execution Started -> SSD -----
CPU Execution Time : -> SSD 41.117129s
----- CPU Execution End -> SSD -----
----- GPU Execution Start -> SSD -----
GPU Read/Write Time : 0.000706s
GPU Execution Time : 0.186061s
----- GPU Execution End -> SSD -----

*****
GPU Speedup over CPU with method -> SSD 220.987
*****

```

Performance on NVIDIA

```

Using platform 'AMD Accelerated Parallel Processing' from 'A
Using device 1 / 1
Running on gfx90c

----- CPU Execution Started -> SAD -----
CPU Execution Time : -> SAD 38.751662s
----- CPU Execution End -> SAD -----
----- GPU Execution Start -> SAD -----
GPU Read/Write Time : 0.002131s
GPU Execution Time : 0.059543s
----- GPU Execution End -> SAD -----

*****
GPU Speedup over CPU with method -> SAD 650.818
*****

----- CPU Execution Started -> SSD -----
CPU Execution Time : -> SSD 39.270400s
----- CPU Execution End -> SSD -----
----- GPU Execution Start -> SSD -----
GPU Read/Write Time : 0.000414s
GPU Execution Time : 0.071444s
----- GPU Execution End -> SSD -----

*****
GPU Speedup over CPU with method -> SSD 549.667
*****

```

Performance on AMD

Dedicated AMD GPU has outperformed the basic NVIDIA GPU.

In both GPU's, CPU performance is very low it doesn't have parallel processing.

## 2. Work Breakdown of Team Members

Tasks achieved from the team

- Task 1: Understanding the problem and literature research
- Task 2: Deciding and implementing logic for CPU SSD/SAD
- Task 3: Deciding and implementing logic for GPU SAD/SSD
- Task 4: Analysing the output and writing the report
- Task 5: Regular Debug sessions
- Task 6: Analysing the performance on AMD GPU

Team worked collectively to achieve the results. Tasks were divided amongst the team and regular debug sessions were scheduled to discuss the issues and find fixes.

Task 1 was done together to understand the problem and possible ways of solving the problem. Task 2 to 5 was looked together and then divided between the team members for implementation. Contribution towards report were done based on the tasks assigned. Finally, team members had regular sync sessions to decide on the progress and resolve errors.

Team member	Task Number
Harish Neerthadi Gowdru	1,5,2
Adarsh Palyam Satish	1,5,3,6
Hithesh Chandra Chandrashekaraiah	1,5,4

3. References

- [1] Hwang, Jae Jeong & Wu, Hong Ren. (2011). Stereo Image Quality Assessment Using Visual Attention and Distortion Predictors. TIIS. 5. 1613 1631.
- [2] [https://en.wikipedia.org/wiki/Sum\\_of\\_absolute\\_differences](https://en.wikipedia.org/wiki/Sum_of_absolute_differences)
- [3] <http://mccormickml.com/2014/01/10/stereo-vision-tutorial-part-i/>
- [4] Gasim Mammodov, sobel filter and Opencl, High Performance Programming with Graphic Cards Lab Course
- [5] <https://ieeexplore.ieee.org/document/8267934>
- [6] <https://vision.middlebury.edu/stereo/data/scenes2003/>